Notice of Allowability	Application No.	Applicant(s)	
	10/669,934	NOURI ET AL.	
	Examiner	Art Unit	
	Miranda Le	2167	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *08/21/2007*.

2. ☒ The allowed claim(s) is/are *1,3-6,8-11 and 13-15*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date *10/25/07* .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

M.L.

Miranda Le
October 25, 2007

DETAILED ACTION

1. This communication is responsive to Amendment filed 08/21/2007.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Applicant's representative, Mr. David Victor, on Octoberber 11, 2007.

The application has been amended as follows:

- **Cancel claim 2.**
- **Claim 1 has been amended as:**

An article of manufacture for use in a computer system for translating a path expression in an object oriented query to a relational database outer join, said path expression comprising a navigation path through a relationship in a schema, said article of manufacture comprising a computer-useable storage medium having a computer program embodied in said medium which causes the computer system to execute the method steps comprising:

analyzing each path expression defined in each level of the object oriented query;

identifying each path expression which can be a candidate for a translation to an outer join;

ordering the path expression starting with path expression defined in a FROM clause, adding to the FROM clause path expression, each path expression identified as a candidate for a translation to an outer join, and making the ordered path expressions as input to a select operator for each level of the object oriented query;

grouping the ordered path expressions sequentially based upon on a source-target dependency between ordered path expressions and based upon the identifications as a candidate for a translation to an outer join;

creating a quantifier for each path expression, said quantifier comprising a variable representing a table in a relational database;

replacing each grouped path expression with a corresponding quantifier and related table in a relational database;

performing optimization on the grouped quantifiers, said optimization identifying quantifiers which can be a candidate for a translation to an inner join;

generating an outer join for each quantifier which remains after optimization a candidate for a translation to an outer join;

generating an inner join for each quantifier which remains after optimization a candidate for a translation to an inner join; and

completing a translation of the object oriented query to a relational query.

- **Claim 3 has been amended as:**

The article of manufacture of claim 1 wherein the optimization identifies a quantifier as a candidate for a translation to an inner join if a corresponding path expression is used in a FROM clause.

- **Claim 4 has been amended as:**

The article of manufacture of claim 1 wherein the optimization identifies a quantifier as a candidate for a translation to an inner join if a LIKE, IN, or BETWEEN operator exists in a WHERE clause containing a corresponding path expression.

- **Claim 5 has been amended as:**

The article of manufacture of claim 1 wherein the optimization identifies a quantifier as a candidate for a translation to an inner join if an EQUAL, LESS THAN, GREATER THAN, LESS THAN OR EQUAL, GREATER THAN OR EQUAL, NOT EQUAL, or NOT NULL operator exits in a WHERE clause.

- **Cancel claim 7.**

- **Claim 6 has been amended as:**

A method of translating a path expression in an object oriented query to a relational database outer join, said path expression comprising a navigation path through a relationship in a schema, said article of manufacture comprising a computer-useable storage medium having a computer program embodied in said medium which causes the computer system to execute the method steps comprising:

analyzing each path expression defined in each level of the object oriented query; identifying each path expression which can be a candidate for a translation to an outer join;

ordering the path expression starting with path expression defined in a FROM clause, adding to the FROM clause path expression, each path expression identified as a candidate for a translation to an outer join, and making the ordered path expressions as input to a select operator for each level of the object oriented query;

grouping the ordered path expressions sequentially based upon on a source-target dependency between ordered path expressions and based upon the identifications as a candidate for a translation to an outer join;

creating a quantifier for each path expression, said quantifier comprising a variable representing a table in a relational database;

replacing each grouped path expression with a corresponding quantifier and related table in a relational database;

performing optimization on the grouped quantifiers, said optimization identifying quantifiers which can be a candidate for a translation to an inner join;

generating an outer join for each quantifier which remains after optimization a candidate for a translation to an outer join;

generating an inner join for each quantifier which remains after optimization a candidate for a translation to an inner join; and

completing a translation of the object oriented query to a relational query.

- **Claim 8 has been amended as:**

The method of claim 6 wherein the optimization identifies a quantifier as a candidate for a translation to an inner join if a corresponding path expression is used in a FROM clause.

- **Claim 9 has been amended as:**

The method of claim 6 wherein the optimization identifies a quantifier as a candidate for a translation to an inner join if a LIKE, IN, or BETWEEN operator exists in a WHERE clause containing a corresponding path expression.

- **Claim 10 has been amended as:**

The method of claim 6 wherein the optimization identifies a quantifier as a candidate for a translation to an inner join if an EQUAL, LESS THAN, GREATER THAN, LESS THAN OR EQUAL, GREATER THAN OR EQUAL, NOT EQUAL, or NOT NULL operator exits in a WHERE clause.

- **Cancel claim 12.**
- **Claim 11 has been amended as:**

A computer system including a computer readable storage medium having instructions executed by a processor for translating a path expression in an object oriented query to a relational database outer join, said path expression comprising a navigation path through a relationship in a schema, wherein the computer readable storage medium includes:

computer program instructions for analyzing each path expression defined in each level of the object oriented query;

computer program instructions for identifying each path expression which can be a candidate for a translation to an outer join;

computer program instructions for ordering the path expression starting with path expression defined in a FROM clause, adding to the FROM clause path expression, each path expression identified as a candidate for a translation to an outer join, and making the ordered path expressions as input to a select operator for each level of the object oriented query;

computer program instructions for grouping the ordered path expressions sequentially based upon on a source-target dependency between ordered path expressions and based upon the identifications as a candidate for a translation to an outer join;

computer program instructions for creating a quantifier for each path expression, said quantifier comprising a variable representing a table in a relational database;

computer program instructions for replacing each grouped path expression with a corresponding quantifier and related table in a relational database;

computer program instructions for performing optimization on the grouped quantifiers, said optimization identifying quantifiers which can be a candidate for a translation to an inner join;

computer program instructions for generating an outer join for each quantifier which remains after optimization a candidate for a translation to an outer join;

computer program instructions for generating an inner join for each quantifier which remains after optimization a candidate for a translation to an inner join; and

completing a translation of the object oriented query to a relational query.

- **Claim 13 has been amended as:**

The computer system of claim 11 wherein the optimization identifies a quantifier as a candidate for a translation to an inner join if a corresponding path expression is used in a FROM clause.

- **Claim 14 has been amended as:**

The computer system of claim 11 wherein the optimization identifies a quantifier as a candidate for a translation to an inner join if a LIKE, IN, or BETWEEN operator exists in a WHERE clause containing a corresponding path expression.

- **Claim 15 has been amended as:**

The computer system of claim 11 wherein the optimization identifies a quantifier as a candidate for a translation to an inner join if an EQUAL, LESS THAN, GREATER THAN, LESS THAN OR EQUAL, GREATER THAN OR EQUAL, NOT EQUAL, or NOT NULL operator exits in a WHERE clause.

Reasons for Allowance

3. Claims 1, 3-6, 8-11, 13-15 are allowed, now renumbered as 1-12.

4. The following is a statement of reasons for the indication of allowable subject matter:

The present invention is directed to a method, system, article of manufacture for translating a path expression of an object oriented query into relational joins.

Claim 1 recites, or similarly recites, in combination with the remaining elements, the steps of:

performing optimization on the grouped quantifiers, said optimization identifying quantifiers which can be a candidate for a translation to an inner join;

generating an outer join for each quantifier which remains after optimization a candidate for a translation to an outer join;

generating an inner join for each quantifier which remains after optimization a candidate for a translation to an inner join.

The closest prior art, Anonsen et al. (U.S. Pat. No. 7,082,433), shows a substantially similar method wherein join expressions, expressed in terms of objects, are translated into a relational database join statement by generating a parse tree based on the join expression. The parse tree is traversed to build the relational database join statement (Summary). While Anonsen discloses expression forms a parse tree and a Directed Acylic Graph (DAG), wherein the DAG contains the objects being joined and their joins to each other, Anonsen does not disclose performing optimization on the grouped quantifiers, as Anonsen does not fairly disclose grouping the ordered path expressions sequentially based upon the identifications as a candidate for a translation to an outer join. In addition, Chow et al. (US Pat. No. 6,941,298), shows an analogous method that provides Enterprise Java Bean Query Language features, which are comprised of a set of enhancements to the standard Query Language and further increase the overall usefulness of the Query Language; however, Anonsen et al. and Chow et al., singularly or in combination, still fail to anticipate or render the above cited limitations obvious.

Claim 6 recites, or similarly recites, in combination with the remaining elements, the steps of:

performing optimization on the grouped quantifiers, said optimization identifying quantifiers which can be a candidate for a translation to an inner join;

generating an outer join for each quantifier which remains after optimization a candidate for a translation to an outer join;

generating an inner join for each quantifier which remains after optimization a candidate for a translation to an inner join.

The closest prior art, Anonsen et al. (U.S. Pat. No. 7,082,433), shows a substantially similar method wherein join expressions, expressed in terms of objects, are translated into a relational database join statement by generating a parse tree based on the join expression. The parse tree is traversed to build the relational database join statement (Summary). While Anonsen discloses expression forms a parse tree and a Directed Acylic Graph (DAG), wherein the DAG contains the objects being joined and their joins to each other, Anonsen does not disclose performing optimization on the grouped quantifiers as Anonsen does not disclose grouping the ordered path expressions sequentially based upon the identifications as a candidate for a translation to an outer join. In addition, Chow et al. (US Pat. No. 6,941,298), shows an analogous method that provides Enterprise Java Bean Query Language features which are comprised of a set of enhancements to the standard Query Language and further increase the overall usefulness of the Query Language; however, Anonsen et al. and Chow et al., singularly or in combination, still fail to anticipate or render the above cited limitations obvious.

Claim 11 recites, or similarly recites, in combination with the remaining elements, the steps of :

performing optimization on the grouped quantifiers, said optimization identifying quantifiers which can be a candidate for a translation to an inner join;

generating an outer join for each quantifier which remains after optimization a candidate for a translation to an outer join;

generating an inner join for each quantifier which remains after optimization a candidate for a translation to an inner join.

The closest prior art, Anonsen et al. (U.S. Pat. No. 7,082,433), shows a substantially similar method wherein join expressions, expressed in terms of objects, are translated into a relational database join statement by generating a parse tree based on the join expression. The parse tree is traversed to build the relational database join statement (Summary). While Anonsen discloses expression forms a parse tree and a Directed Acylic Graph (DAG), wherein the DAG contains the objects being joined and their joins to each other, Anonsen does not disclose performing optimization on the grouped quantifiers as Anonsen does not disclose grouping the ordered path expressions sequentially based upon the identifications as a candidate for a translation to an outer join. In addition, Chow et al. (US Pat. No. 6,941,298), shows an analogous method that provides Enterprise Java Bean Query Language features which are comprised of a set of enhancements to the standard Query Language and further increase the overall usefulness of the Query Language; however, Anonsen et al. and Chow et al., singularly or in combination, still fail to anticipate or render the above cited limitations obvious.

5. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance".

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Miranda Le whose telephone number is (571) 272-4112. The examiner can normally be reached on Monday through Friday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Cottingham, can be reached on (571) 272-7079. The fax number to this Art Unit is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-3900.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

M.L.

Miranda Le
October 25, 2007